

concerning the “less than 10Å” limitation had been made in parent application 09/895,679<sup>1</sup>, but thereafter the rejection was withdrawn.<sup>2</sup> The Examiner indicated during the telephone interview that in the present case she would withdraw the rejection regarding the “less than 10Å” limitation.

Applicants’ attorney and the Examiner next discussed the antiferromagnetic limitation. The Examiner’s primary concern was whether Applicants had established that antiferromagnetic coupling was inherent throughout the claimed thickness range. She noted an article by Parkin et al. establishing that antiferromagnetic coupling depends on the thickness of the Ru interlayer. (Applicants’ attorney assumes that the Examiner was referring to Parkin et al., “Oscillations in Exchange Coupling and Magnetoresistance in Metallic Superlattice Structures: Co/Ru, Co/Cr, and Fe/Cr”, Physical Review Letters, May 7, 1990.<sup>3</sup>) Although Applicants demonstrated that antiferromagnetic coupling existed for Ru intermediate layer thicknesses of 3, 6, 8, 10 and 12Å<sup>4</sup>, the Examiner wanted Applicants to show how it was known, in light of Parkin, that antiferromagnetic coupling existed for thicknesses between 8 and 10Å.

Finally, the Examiner stated that if Applicants overcome the 112 rejection concerning antiferromagnetic coupling, Applicants should be prepared to explain why the claims are patentable over Bian and Carey.

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<sup>1</sup> See the office action dated 4/16/03, second paragraph of section 2.

<sup>2</sup> See the Office Action dated 8/12/03. Pages 5-6 of the Response to Office Action Dated April 16, 2003 explain why this limitation is supported.

<sup>3</sup> Parkin is of record in the present application as well as the parent and grandparent applications.

<sup>4</sup> See Declaration of Dr. Christopher H. Bajorek executed February 3, 2003, exhibit B.

### Parkin Supports Applicants' Position

First, Applicants point out that Parkin page 2306, right column, states that the periodicity of antiferromagnetic coupling for Co/Ru systems is 12-14Å. Accordingly, there is no reason one would suspect that antiferromagnetic coupling would exist for Ru thicknesses for 3, 6, 8, 10 and 12Å but not, for example, 9Å.

Second, Parkin Figs.3a and 3b show that antiferromagnetic coupling disappears at values greater than 10Å, and not below 10Å.

Third, Parkin page 2306, left column, points out that a Ru thickness of 3Å corresponds to two monolayers. In other words, each layer of Ru atoms is about 1.5 Å thick. Accordingly, it does not make sense for one skilled in the art to suspect oscillation between 8 and 10Å atoms because that thickness differential amounts to only one atom.

### Carey Is Not Prior Art

Carey (U.S. Patent 6,280,813) was based on an application filed 10/8/99. Applicants' grandparent U.S. application 09/265,597 was filed 3/10/99. Therefore, Carey cannot be cited against the present application.

### Applicants' Invention Distinguishes Over Bian

Bian (U.S. Patent 6,077,586) Fig. 2 illustrates a magnetic layer 14, a spacer layer 15 and a magnetic layer 16. The Bian abstract states that "The spacer between the magnetic layers may be made from the same material as the underlayer, but may also be different, e.g. an hexagonal crystalline material such as Ru." At col. 4, lines 49-51, Bian

states “The spacer layer is normally relatively thin in comparison with the underlayer and will typically be 1 to 20 nm in thickness.” (1 to 20 nm is the same as 10 to 200Å.) As explained below, Bian actually teaches directly away from Applicants’ invention.

The first sentence of Bian’s abstract is: “A thin film disk with laminated magnetic layers, for use in a disk drive, is described which exhibits a single switching behavior resulting in a smooth hysteresis loop.” Bian’s summary (col. 2, lines 38-41) also urges a smooth hysteresis loop. A smooth hysteresis loop is inconsistent with antiferromagnetic coupling. (Again, see exhibit 3 of the Bajorek declaration cited in footnote 4.) Therefore, Bian instructs the reader to avoid a structure that exhibits antiferromagnetic coupling, and would certainly avoid anything with a Ru interlayer thickness between 3 and less than 10Å.

Applicants re-direct the Examiner’s attention to Parkin Figs. 3a and 3b. Antiferromagnetic coupling is insignificant for Ru thicknesses above a couple of nanometers. Since Bian does not want antiferromagnetic coupling (i.e. he wants a smooth hysteresis loop), one skilled in the art will choose a thickness range away from what Applicants claim, above 10Å. Therefore, Applicants’ claims distinguish over Bian.

#### Applicants Have Overcome All Other Rejections in the Office Action

The Office Action rejects claim 20 because of an antecedent basis error. Applicants have corrected this error.

As claims 1 and 10-23 are in condition for allowance, Applicants earnestly request that these claims be allowed. If the Examiner’s next action is other than

allowance, the Examiner is requested to telephone Applicants' attorney at (408) 732-9500.

Respectfully submitted,

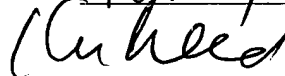


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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on February 22, 2005

February 22, 2005

Date



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